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2 What is claimed is:

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5 1. A method of fabrication of a bond pad structure, comprising the steps of:

6 a) providing a top wiring layer and a top dielectric layer over a

7 semiconductor structure;

8 b) forming a buffer dielectric layer over said top wiring layer and said top

9 dielectric layer;

10 c) forming a buffer opening in said buffer dielectric layer exposing at

11 least of portion of said top wiring layer;

12 d) forming a barrier layer over said buffer dielectric layer, and said top

13 wiring layer in said buffer opening;

14 e) forming a conductive buffer layer over said barrier layer;

15 f) planarizing said conductive buffer layer to form a buffer pad in said

16 buffer opening;

17 g) forming a passivation layer over said buffer pad and said buffer

18 dielectric layer;

19 h) forming a bond pad opening in said passivation layer over at least a

20 portion of said buffer pad;

- 1           i)           forming a bond pad support layer over said buffer pad and passivation  
2                   layer;  
3           j)           forming a bond pad layer over said bond pad support layer;  
4           k)           patterning said bond pad layer and said bond pad support layer to form  
5                   a bond pad and bond pad support.

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- 7    2. The method of claim 1 wherein said top wiring layer is comprised of Cu alloy; said top  
8           wiring layer is a damascene interconnect.

- 9    3. The method of claim 1 wherein said top dielectric layer is comprised of oxide made  
10           from tetraethylorthosilicate (TEOS) reactants and has a thickness between 6750 and  
11           8250 Å.

- 12   4. The method of claim 1 wherein said top dielectric layer is comprised black diamond <sup>TM</sup>  
13           film.

- 14   5. The method of claim 1 wherein said top dielectric layer is comprised an oxide based  
15           low k dielectric material with a K equal or less than 3.0.

- 16   6. The method of claim 1 wherein said buffer dielectric layer is comprised of TEOS oxide  
17           and has a thickness between 6750 and 8250 Å.

- 1     7. The method of claim 1 wherein said barrier layer is comprised of Ta or a bilayer  
2                comprised of a Cr layer and a Cr-Cu layer; said barrier layer has a thickness  
3                between 360 and 440 Å.
- 4     8. The method of claim 1 wherein said conductive buffer layer is comprised of an  
5                aluminum alloy with between a 99.45 and 99.55 wt % aluminum and between  
6                0.45 and 0.55 wt % copper; said conductive buffer layer has a thickness between  
7                6750 and 8250 Å.
- 8     9. The method of claim 1 wherein the planarization of said conductive buffer layer  
9                comprises a chemical-mechanical polish step.
- 10    10. The method of claim 1 wherein said passivation layer is comprised of a three layer  
11                structure of (1) lower silicon nitride layer, (2) undoped silicate glass layer and  
12                (3) upper silicon nitride layer; and has a thickness between 13500 and 16500 Å.
- 13    11. The method of claim 1 wherein said bond pad opening has an area between 2500 and  
14                10000 sq µm.
- 15    12. The method of claim 1 wherein said buffer opening is larger than said bond pad  
16                opening; said buffer opening extends beyond said bond pad opening on all sides.
- 17    13. The method of claim 1 wherein said bond pad support layer is comprised of a material  
18                selected from the group consisting of Ti, TiW, W and Cr; and has thickness  
19                between 2000 and 6000 Å.

1 14. The method of claim 1 wherein said bond pad layer comprised of an Al-Cu alloy with  
2 Al between 99.45 and 99.55 wt % and Cu between 0.45 and 0.55 %; said bond  
3 pad layer has a thickness between 6000 and 15000 Å; and said buffer pad underlies  
4 the entire bond pad.

5 15. The method of claim 1 wherein said buffer pad underlies the entire bond pad; said  
6 buffer pad has a larger area than said bond pad by between 10 % and 30 % of the  
7 area of the bonding pad.  
8

9 16. A method of fabrication of a bond pad structure; comprising the steps of:

10 a) providing a top wiring layer and a top dielectric layer over a  
11 semiconductor structure;

12 (1) said top wiring layer comprised of Cu alloy; said top wiring layer is a  
13 damascene interconnect;

14 (2) said top dielectric layer is comprised of TEOS oxide and has a  
15 thickness between 6750 and 8250 Å;  
16

17 b) forming a buffer dielectric layer over said top wiring layer and said top  
18 dielectric layer;

1                   (1) said buffer dielectric layer is comprised of TEOS oxide and has a  
2                   thickness between 6750 and 8250 Å;

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4           c)           a buffer opening in said buffer dielectric layer exposing at least of  
5           portion of said top wiring layer;

6           d)           forming a barrier layer over said buffer dielectric layer, and said top  
7           wiring layer in said buffer opening;

8                   (1) said barrier layer is comprised of Ta or a bilayer comprised of a Cr layer  
9                   and a Cr-Cu layer; said barrier layer has a thickness between 360 and  
10                  440 Å;

11

12           e)           forming a conductive buffer layer over said barrier layer;

13                   (1) said conductive buffer layer is comprised of an Aluminum alloy with  
14                   between a 99.45 and 99.55 wt % aluminum and between 0.45 and  
15                   0.55 wt % copper; said conductive buffer layer has a thickness  
16                   between 6570 and 8250 Å;

17           f)           planarizing said conductive buffer layer to form a buffer pad in said  
18           buffer opening;

- 1 (1) the planarization of said conductive buffer layer comprises a chemical-  
2 mechanical polish step;
- 3 g) forming a passivation layer over said buffer pad and said buffer  
4 dielectric layer; said passivation layer is comprised of a three layer structure of  
5 (1) lower silicon nitride layer, (2) undoped silicate glass (USG) layer, and (3)  
6 upper silicon nitride layer; and has a thickness between 13500 and 16500 Å;
- 7 h) forming a bond pad opening in said passivation layer over at least a  
8 portion of said buffer pad
- 9 i) forming a support layer over said buffer pad and said buffer dielectric  
10 layer;
- 11 (1) said bond pad support layer is comprised of a material selected from the  
12 group consisting of Ti, TiW, and Cr; and has thickness between 2000  
13 and 6000 Å;
- 14 j) forming a bond pad layer over said bond pad support layer;
- 15 (1) said bond pad layer comprised of an Al-Cu alloy and said bond pad  
16 layer has a thickness between 6000 and 15000 Å;
- 17 k) patterning said bond pad layer and said bond pad support layer to form  
18 a bond pad and bond pad support;

1                   (1) said buffer pad underlies the entire bond pad; said buffer pad has a  
2                   larger area than said bond pad by between 10 % and 30 % of the area  
3                   of the bonding pad.  
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5    17. A bond pad structure comprising:

- 6           a)           a top wiring layer and a top dielectric layer over a semiconductor  
7           structure;  
8           b)           a buffer dielectric layer over said top wiring layer and said top dielectric  
9           layer;  
10          c)           a buffer opening in said buffer dielectric layer exposing at least of  
11          portion of said top wiring layer;  
12          d)           a buffer pad and a barrier layer over said buffer dielectric layer and said  
13          top wiring layer in said buffer opening;  
14          e)           forming a passivation layer over said conductive buffer pad and said  
15          buffer dielectric layer;  
16          f)           a bond pad opening in said passivation layer over at least a portion of  
17          said buffer pad  
18          g)           a bond pad and bond pad support over said passivation layer over at  
19          least a portion of said buffer pad. in at least said bond pad opening.

- 1 18. The bond pad structure of claim 17 wherein said top wiring layer is comprised of Cu  
2 alloy; said top wiring layer is a damascene interconnect.
- 3 19. The bond pad structure of claim 17 wherein said top dielectric layer is comprised of  
4 TEOS oxide and has a thickness between 6750 and 8250 Å.
- 5 20. The bond pad structure of claim 17 said top dielectric layer is comprised black  
6 diamond <sup>TM</sup> film.
- 7 21. The bond pad structure of claim 17 said top dielectric layer is comprised an oxide  
8 based low k dielectric material with a K equal or less than 3.0.
- 9 22. The bond pad structure of claim 17 wherein said barrier layer is comprised of Ta or a  
10 bilayer comprised of a Cr layer and a Cr-Cu layer; said barrier layer has a thickness  
11 between 360 and 440 Å.
- 12 23. The bond pad structure of claim 17 wherein said conductive buffer layer is comprised  
13 of an Aluminum alloy with between a 99.45 and 99.55 wt % Aluminum and  
14 between 0.45 and 0.55 wt % copper; said conductive buffer layer has a thickness  
15 between 6750 and 8250 Å.
- 16 24. The bond pad structure of claim 17 wherein said passivation layer is comprised of a  
17 three layer structure of (1) lower silicon nitride layer, (2) undoped silicate glass  
18 layer and (3) upper silicon nitride layer; and has a thickness between 13500 and  
19 16500 Å.

1    25. The bond pad structure of claim 17 wherein said bond pad support layer is comprised  
2            of a material selected from the group consisting of Ti or TiW, and Cr; and has  
3            thickness between 2000 and 6000 Å.

4    26. The bond pad structure of claim 17 wherein said bond pad layer comprised of an Al-Cu  
5            alloy and said bond pad layer has a thickness between 6000 and 15000 Å; and said  
6            buffer pad underlies the entire bond pad.

7    27. The bond pad structure of claim 17 wherein said buffer pad underlies the entire bond  
8            pad; said buffer pad has a larger area than said bond pad by between 10 % and 30  
9            % of the area of the bonding pad.

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